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APPLICATION FOR LETTERS PATENT

TITLE: A PORTABLE WIRELESS COMMUNICATION  
APPARATUS

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# A PORTABLE WIRELESS COMMUNICATION APPARATUS

## CROSS REFERENCES TO RELATED APPLICATIONS

The present document is based on Japanese Priority  
5 Document JP 2000-246124, filed in the Japanese Patent  
Office on August 15, 2000, the entire contents of which  
being incorporated herein by reference.

## BACKGROUND OF THE INVENTION

### 10 1. Field of the Invention

The present invention relates to a portable wireless  
communication apparatus provided with a diversity of  
ringing tones, i.e., tones indicating incoming calls, and  
holding tones, and particularly relates to a portable  
15 wireless communication apparatus with a function of music  
playback which enables prestored music data to be used as  
the holding tone during a call.

### 2. Description of the Related Art

Portable telephones available today include models  
20 that are designed to use one of harmony melodies stored  
in memory means as a ringing tone that rings upon  
receiving a call. In this case, the melodies stored in  
the memory means can be selected freely from a plurality  
of tunes prestored at the time of purchase, a plurality  
25 of tunes downloaded through communication to the outside,  
and a plurality of tunes composed by individuals. Herein,  
a harmony melody means a melody provided with chordal  
harmonies including a plurality of level tones.

Some portable telephones even go so far as to  
30 employ such a harmony melody used as a ringing tone as a  
holding tone, when holding the line, to be delivered to a

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party on the other end of the line, and the holding tone itself has an increased freedom of tune selection, with an improvement of its tone quality. Nonetheless, inasmuch as the memory capacity of storing the holding tone has its bounds, limits are set on the number of tunes memorized and the length of a tune, while there are available other portable telephones having an external memory, in which music is stored, functioning as a portable playback system as well.

As described above, conventional portable telephones enable the harmony melodies to serve as the holding tone as well as the ringing tone. Despite considerable improvements made in the selection of tunes and the quality of sound by utilizing the harmony melodies for the holding tone and the ringing tone, there are still problems of limitations imposed on the number of tunes and the length of performance of a tune storable in a built-in memory.

Accordingly, there has been a need for providing, with a relatively simple process of utilizing a tune stored in an eternal memory as a holding tone and/or a ringing tone, a portable telephone which can obviate the aforementioned problems and which can deliver to the party on the other end of the line while on hold, without adding any new special device, music of high tone quality and superior general quality as the holding tone. In addition, there has been another need for providing a portable telephone which can deliver music of high tone quality and superior general quality as the ringing tone, without adding any new special device.

## SUMMARY OF THE INVENTION

To the end described above, the present invention provides a portable wireless communication apparatus, in particular, a portable telephone having wireless communication means for wirelessly carrying out transmission/reception of messages with a party on the other end of the line, memory unit connection means for connecting to an external memory unit, music information processing means for reading out and playing back music data stored in the external memory unit being connected via the memory unit connection means, call holding instruction means for instructing to hold a call upon receiving a call, and control means for controlling the aforementioned music information processing means when holding a call while speaking to a terminal on the other end of the line according to the instructions of the aforementioned call holding instruction means and directing the aforementioned wireless communication means so as to transmit music information as a call holding tone to the aforementioned terminal.

This enables the music stored in the external memory unit to operate as the call holding tone, thereby improving the tone quality and the general quality of the call holding tone and furthering diversity thereof.

## BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a block diagram showing a configuration of a portable telephone according to the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A portable wireless communication apparatus of a

preferred embodiment according to the present invention will be described below in detail with reference to the drawing. In the description, although there will be explained a portable telephone as an example, the present invention is not limited thereto and may be applied any other portable wireless communication apparatuses.

A block diagram in Fig. 1 shows a configuration of the portable telephone of the preferred embodiment according to the present invention.

In Fig. 1, each of the reference numerals indicates as follows: 1: an antenna; 2: a wireless signal processing unit; 3: an audio signal switching unit; 4: a microphone; 5: a receiver; 6: a headphone jack; 7: a key input unit; 8: a display unit; 9: a controlling unit; 10: a music signal processing unit; 11: a memory card serving as an external memory unit; and 12: a ringing tone generating unit.

The antenna 1 transmits and receives radio waves employed for portable telephones. The wireless signal processing unit 2 performs received signal processing by means of decoding received signals from the antenna 1 and carrying out voice decoding, and transmitter signal processing by means of translating inputted audio signals to voice code, modulating it, and transmitting the wireless frequency signals to the antenna 1.

The audio signal switching unit 3 provides a connection or cuts off a connection to the input signals from the wireless signal processing unit 2, the microphone 4, the headphone jack 6, the music signal processing unit 10 or the like with respect to the wireless signal processing unit 2, the receiver 5, and

the headphone jack 6, additionally functioning to output,  
via the ringing tone generating unit 12, ringing tone  
data, such as a harmony melody, sound, voice and the like,  
stored in the memory contained in the control unit 9 upon  
5 receiving a call.

The microphone 4 converts voice to electric signals,  
while the receiver 5 converts electric signals to audio  
signals. The headphone jack 6 is a connection slot for  
the headphone and the earphone microphone connected to  
10 the outside, transmitting and receiving audio signals.

The key input unit 7 comprises a group of switches  
such as ten keys to be used by the user for giving  
operating instructions to the terminal.

The display unit 8 shows to the user information  
15 from the terminal regarding operating status and other  
data.

The control unit 9 confirms the user's operation in  
accordance with the signal received from the key input  
unit 7, and, according to a request therefrom, controls  
20 the operation of the wireless signal processing unit 2,  
the audio signal switching unit 3, the display unit 8 and  
the music signal processing unit 10.

The music signal processing unit 10 reads out music  
data of a tune specified by the external memory 11,  
25 converts music data to music signals, and outputs the  
music signals to the audio signal switching unit 3.  
Although the playback function of converting music data  
to music signals is described in this case for the sake  
of brevity, the music signal processing unit 10 may be  
30 endowed with the recording function of converting the  
music signals to music data and writing it in the

external memory unit 11. The external memory unit 11 which is a memory for storage of music data can be connected to the terminal of the portable telephone via connector and is of detachable construction. In this example, a memory card is what is considered as the external memory unit 11, whereas a non-detachable memory for music data to be installed inside the terminal may also be acceptable.

To hear voice of the party on the other end of the line when making a call with the portable telephone according to the present invention, the receiving signals from the antenna 1 are processed at the wireless signal processing unit 2 for conversion to audio signals which are outputted via the audio signal switching unit 3 to the receiver 5. Further, when transmitting the speaker's voice to the party on the other end of the line, voice input from the microphone 4 is delivered via the audio signal switching unit 3 to the wireless signal processing unit 2 where the input is processed, converted to wireless signals, and transmitted from the antenna 1.

The operations of transmitting an outgoing call and receiving an incoming call are performed as the user operates the key input unit 7, whereas the result of each operation is conveyed to the control unit 9 which executes the operation of transmitting an outgoing call or receiving an incoming call by directing the wireless signal processing unit 2 and the audio signal switching unit 3, the status of operation being notified via the display unit 8 to the user. The headphone jack 6 may be used in lieu of the microphone 4 and the receiver 5.

When the portable telephone of this embodiment

according to the present invention is used as the portable music playback device based on the external memory unit 11 such as the memory card, the control unit 9 controls the audio signal switching unit 3 and the music signal processing unit 10 in accordance with the user's operation received by the key input unit 7, whereafter the music signal processing unit 10 reads out music data in the external memory unit 11, converting the data to music signals and sending the signals to the audio signal switching unit 3 which outputs the signals to the headphone jack 6 or the receiver 5.

The present invention is characterized by the use of the music data stored in the external memory unit 11 upon operation of the apparatus as a portable telephone.

When the operation of holding is performed by the user with respect to the key input unit 7 while having a call, the control unit 9 directs the audio signal switching unit 3, cutting off the wireless signal processing unit 2 from the microphone 4 and the receiver 5, whereupon the control unit 9 controls the music signal processing unit 10, reads out and plays back the tune preset by the user from the external memory unit 11, further controlling the audio signal switching unit 3 and conveying the music signals to the wireless signal processing unit 2, thereby transmitting the music as the holding tone from the antenna 1.

Likewise, the present invention may be adapted to use the music data stored in the external memory unit 11 as the ringing tone. Upon receiving an incoming call, if the user has made a setting beforehand, the control unit 9 controls the music signal processing unit 10 to play



